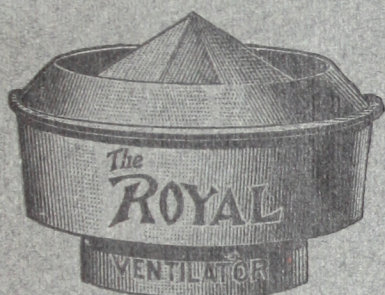


17.9

# VENTILATION



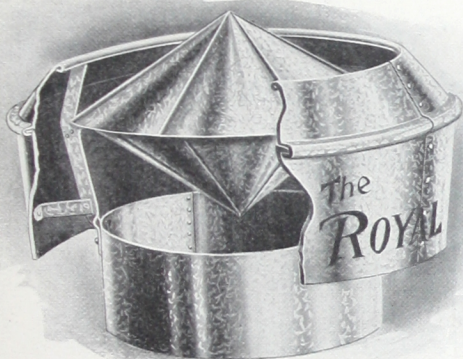
ROYAL VENTILATOR CO  
PHILADELPHIA





DEC 16 1914

# *The* "Royal" Ventilator



United States Patents

Manufactured by the

## Royal Ventilator Co.

415 Locust Street

Philadelphia, Pa.



## Royal Facts

Double Cones.

Scientifically Constructed Deflectors.

Pointed Bottom Cones.

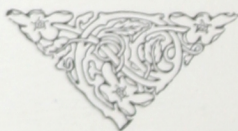
Patented Radiating Ribs.

Satisfied Customers.

Prompt Shipments.

Superiority Over All Others.

Twenty-five Years Engaged Exclusively  
in Manufacturing Ventilators.





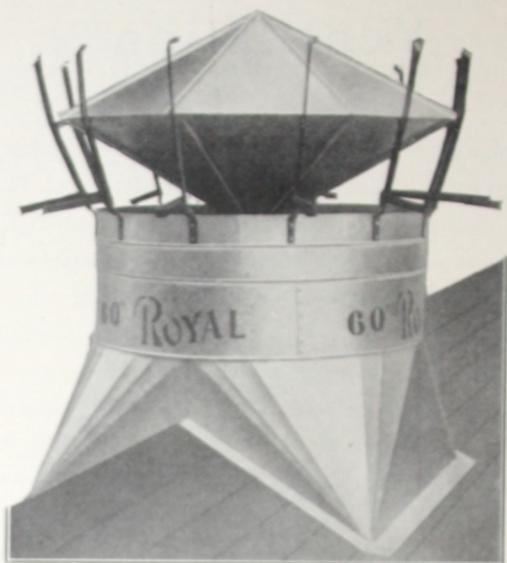
# Ventilation

**T**HERE is nothing more conducive to health and comfort than the proper ventilation of houses, churches, mills, foundries and other buildings. To supply fresh air in sufficient quantities is a matter vital to life. The only correct way to provide continuous fresh air ventilation is by installing scientifically constructed ventilators. The average requirement per person is 30 cubic feet of fresh air, containing 21 per cent. oxygen, per minute, or 1800 cubic feet per hour. Multiply this figure by the number of persons occupying the building, compare the result with the actual cubic air space of same, and invariably you will find that unless there is proper ventilation, the air will become vitiated in one hour.

Since several States have enacted laws to compel ventilation of public buildings, the public now realizes that ventilation is not an unnecessary expense or luxury, but an indispensable necessity, for thereby the health of occupants of ventilated buildings is conserved. Unfortunately, the subject of ventilation is frequently overlooked, and when attention is given it, very often the crudest forms of so-called ventilators or ventilator "cowls" are used. These frequently have no more efficiency than ordinary caps or hoods, which provide little or no upward draft, but allow a down draft or the entrance of rain or snow, thereby forcing back the foul air or gases. Besides they are weak in their construction, liable to rust out in a short time, or become damaged by high wind velocity.

**"Royal"** Ventilators are different. They have double and pointed bottom cones. They have tapered deflectors and patented radiating ribs. In the ROYAL Ventilators the bottom cone is sharpened. This is why the ROYAL will exhaust more air per minute and also why it offers the least resistance to natural or forced draft. ROYAL Ventilators are storm proof and can be made to be both insect and bird proof.

The "ROYAL" is made in every size and shape and is adaptable to every type of building.



Skeleton of a ROYAL VENTILATOR, showing our Edge-wise Braces, our Substantially Constructed Double Cones and our Patented Ribs, making the "ROYAL" the Strongest, Most Durable and Efficient Ventilator made.



One of the several buildings of the International Correspondence School, Scranton, Pa., ventilated with 20 30" and 6 26" ROYAL Ventilators.



**Among the several ventilating devices** on the market, ROYAL Ventilators have during the past twenty-five years won a commanding position. The design of the ROYAL has been the result of long scientific study and experiment combined with many years of practical experience in their manufacture. *Efficiency, strength and durability* are the three important features to consider when selecting a ventilator. The ROYAL excels in all these requisites. The best material and highly skilled labor only are used in its construction.

In addition, the ROYAL is manufactured with greater regard to proportion and with more attention to superiority in detail than any other ventilator. It has fewer parts, is proportionately lighter in weight, as well as neat and graceful in appearance.

It should require but a moment to convince you that the "DOUBLE CONE ROYAL," because of its scientific construction, whereby the weather and gases come in contact with only one side of the metal of the cones, will outlast *all single cone* ventilators, and at the same time exhaust more impure air.

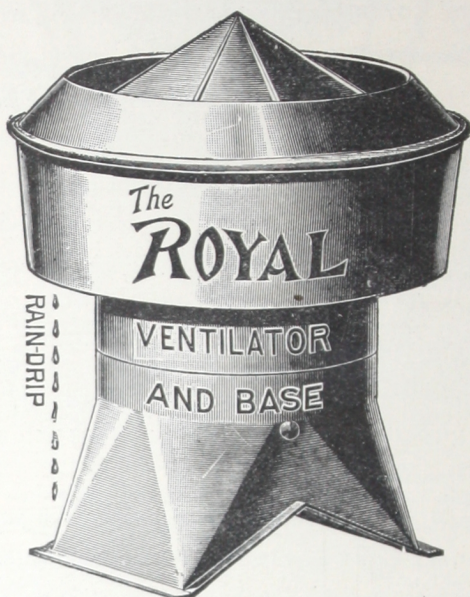
ROYAL Ventilators are unquestionably the cheapest and also the best ventilators on the market. The thousands of ROYALS throughout the country furnish the proof.

**The "Royal" is A Scientific Ventilator Qualifying for every Job of Unusual Requirements.**



# “Royal” Ventilators

With and Without Bases



Ventilator with Base and Damper for Apex of Roof

Always Ventilating, Rain or Shine



Base for Side-Pitch Roof

The economy of buying a good ventilator lies in length of service and the greater efficiency.



They Will Exhaust More Air Than Any  
Other Ventilator Made

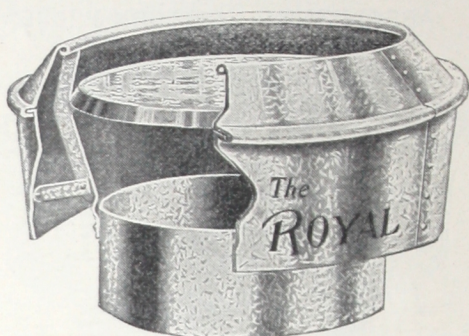


The Ventilator With a Strong,  
Steady Pull



Where Quality Counts, WE Always Win

# The "Royal" Glass Top Ventilators



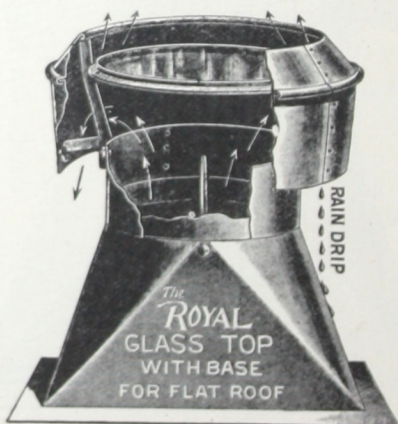
## Are Superior to All Others

The "ROYAL" Glass Top Ventilator contains a greater area of glass, reflects more light and gives more ventilation than other makes.

Thus a 24" has a Glass Top 29" dia.

30"	"	"	"	"	36"	"
36"	"	"	"	"	42"	"
60"	"	"	"	"	72"	"

It is not a compromise between a first-class ventilator and a very poor skylight, but the best of both. The Metal Top "ROYAL" has always ventilated thoroughly, and the introduction of the skylight feature sacrifices none of its ventilating qualities. The full capacity of ventilation is given without interference with the light. The thickness of the glass varies with the size of the ventilator, and full provision for shedding water, snow, etc., has been made.



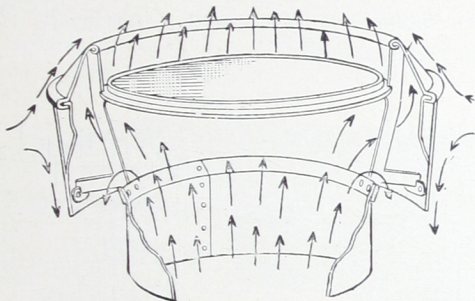
Showing Open Damper which Can be Closed if Desired.  
No Dust or Dirt Accumulates on or Around it



# Light and Ventilation

## Glass Top Ventilators

In recent years, much attention has been directed towards the Glass Top Ventilators, combining the two features of light and ventilation. The ROYAL Glass Top Ventilator possesses many superior features over other types. As in the regular type, the upper and lower deflectors are made tapering, deflecting the outside air currents, so as to create a proper vacuum in the tube. The edgewise braces are the same, the ring holding the Glass is made of Malleable Iron, with the proper rain drips, in such a manner as to divert all condensation and



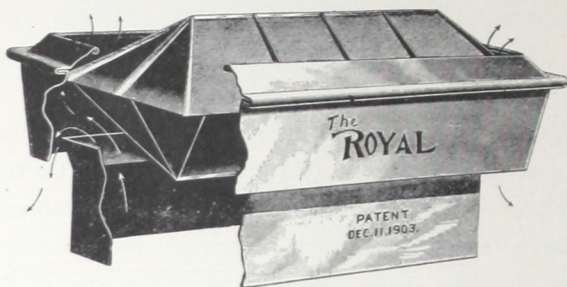
A Real Glass Top—Light and Ventilation

prevent rain from entering the neck of the ventilator. The cut on Page 8 shows a greater area of glass than the corresponding area of the neck of the ventilator. A comparison with all other makes will show that the ROYAL Glass Top Ventilators contain a greater area of glass, affording increased light and ventilation. Ribbed wire glass of either 1-4" or 3-8" thickness, depending upon the size of the ventilator, is used. Either polished, rough or maized wire glass may be used. The ribbed wired glass, however, gives the best diffusion of light. They may be equipped with either the ordinary metal or glass dampers, in both the standard and fire retarding types.

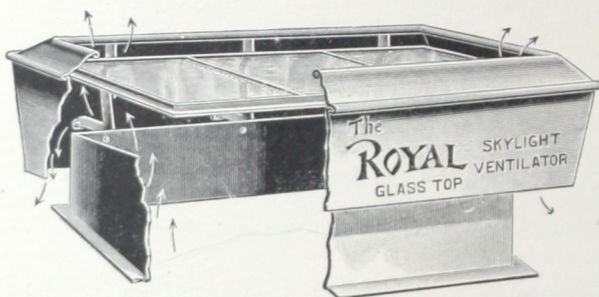
NOTE.—In making quotations on Glass Top Ventilators, all prices are made with the understanding that, on all sizes above 24", the glass will be boxed and shipped separate and put in place by the purchaser.

# A Type of Ventilator

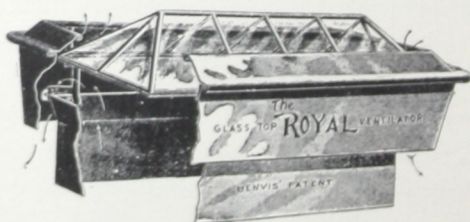
Justifying the specifications of Architects and Engineers for the better class of buildings.



The Glass Top is much superior to a ventilating skylight—as it always ventilates without admitting cold air, draughts and dust. Absolutely stormproof.



They can be equipped with either Metal or Glass Damper. The Metal Damper can be regulated to shut out the intense glare and yet permit ventilation.



The above are sectional views of "ROYAL" Rectangular Ventilators. Many of these are in use on Public Buildings all over the country.



# "Royal" Rectangular and Square Ventilators

The Rectangular ventilator has been designed to meet conditions where the maximum amount of ventilation is required at all times. The Rectangular Glass Top will provide much greater ventilation than is obtained from an ordinary skylight with operating sash. There is nothing to operate or get out of order. They are adapted to buildings of all descriptions. This type has had extensive use on Schools, Hospitals, Laundries and Manufacturing Buildings, and is specified by many Architects in lieu of Monitors and Skylights.

They can be made to any desired size, with or without dampers, Glass or Metal Top. Specially braced, absolutely rigid and Storm Proof.

Public School, Passaic, N. J., 13 Rectangular, various sizes.

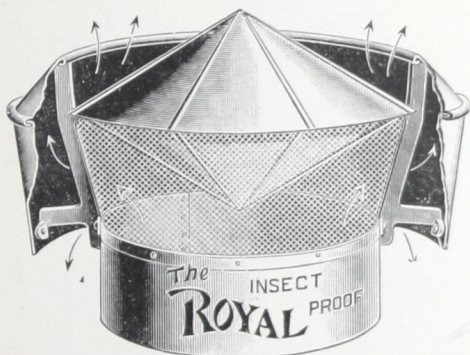
Public School, Orange, N. J., 1—61" x 61".

St. Mary's School, Garden City, N. J., 1—60" x 60".

Public School, Salem, Mo., 1—12" x 60".

American Pulley Co., Philadelphia, Pa., 1—60" x 180".

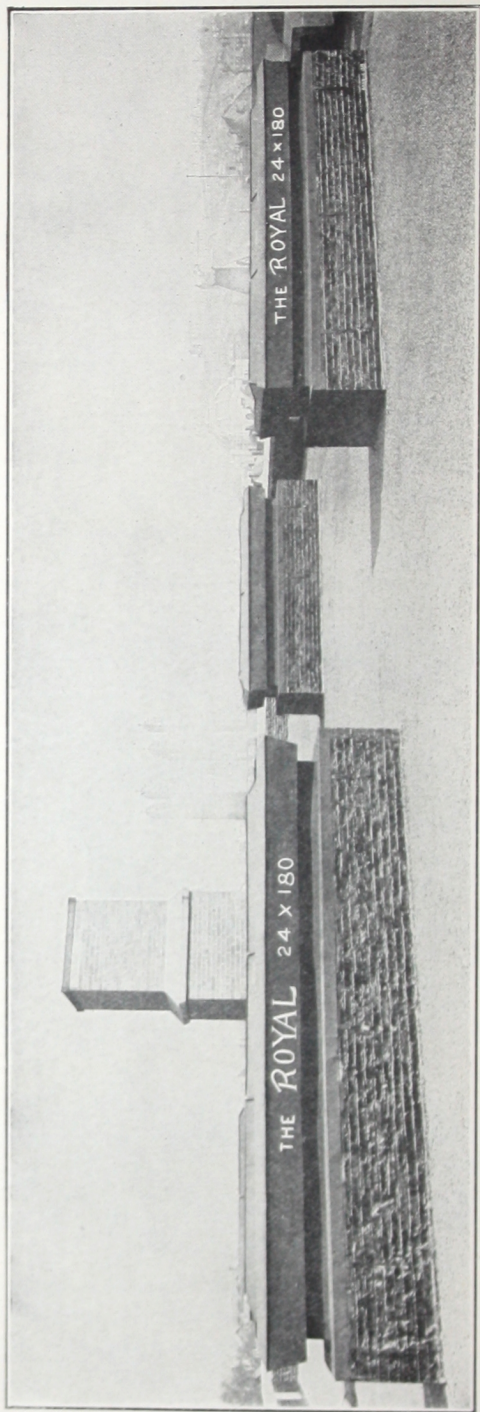
Smaltz Building, Philadelphia, Pa., 1—120" x 66".



## The "Royal" Way

of ventilating Residences, Dairy Barns, Hospitals, Sanatoriums, Powder Mills, etc., by use of the "ROYAL" Double Cone Insect Proof Ventilator.

The New Philadelphia Municipal Hospital is equipped with 28—30" Copper Insect Proof ROYALS, specified by Wilson, Harris & Richards, Architects. There are 30—12" in use by the Venezuela Ore Company, Venezuela, S. A.



Partial View of 6 Rectangular "Royal" Ventilators on Ventilating Flues of the St. Paul's Cathedral School, Pittsburgh, Pa.—John T. Comes, Architect, Pittsburgh

"Royal" Ventilators are Used on Parochial Schools All Over the Country



If you will study carefully the superior design and construction of the "ROYAL," you will admit that it is a scientific ventilator, and perfectly rigid. The sharpened bottom cone offers the least resistance to the ascending column of impure air, smoke, gases, etc., and the joining of the two cones eliminates the collection of this foul air underneath the top cone and prevents down draft.

In addition to the double cone, the ROYAL has two tapered outside deflectors, which deflect the air currents over the top of the ventilator, giving it the greatest pulling power. To manufacture these tapered deflectors and the bottom cone means additional labor and material, but they give the ROYAL the greatest efficiency obtainable.

The ROYAL is not only superior in efficiency but in construction as well. They contain edgewise braces of Malleable Iron running the complete length of the ventilator head, the edges of the deflectors are wired and the standing seams in the cones add *strength and durability*.

The economy of buying a good ventilator lies in their long service and greater efficiency. As for the superiority of the "ROYAL," you have but to note the list of our many satisfied customers.

### **Our Motto is "Quality, Not Quantity"**

Of late there has been a flood of cheaply made ventilators to imitate the "ROYAL," and the consumer is the one who loses. Some Architects fail to realize the importance of proper inspection and the havoc which is wrought by using an inferior ventilator.

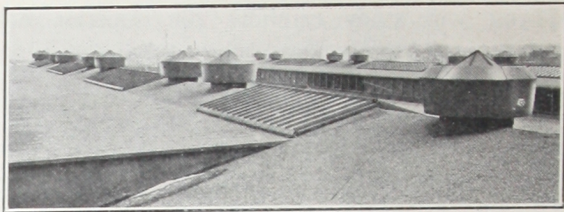
Many buyers are influenced by the matter of price, without considering quality; or are guided by the advice of someone who is interested in selling the goods on which he makes the greatest profit. Insist on obtaining the "ROYAL". Use no Substitute.

The ROYAL Ventilator has solved the ventilating problems of Schools, Churches, Mills, Foundries and buildings of every description.

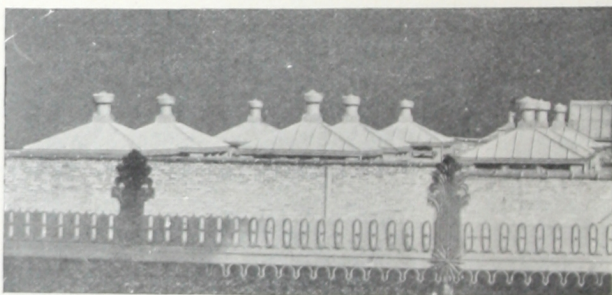
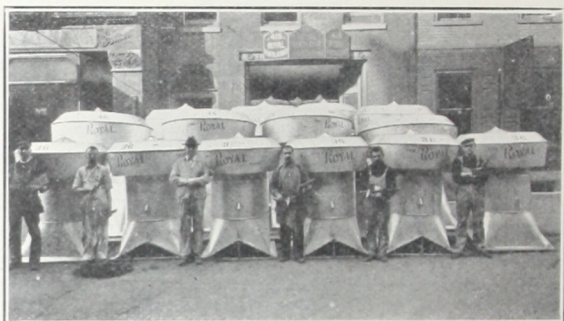
**Insist** on your **Architect** specifying "**Royal**" **Ventilators** if you would obtain the ventilator that will ventilate under **all** conditions.

### **Workmanship and Material are the Best**

We have the equipment necessary to do accurate work, and—*we do it*. In the selection of materials and in construction the greatest care is taken to maintain the highest standard.



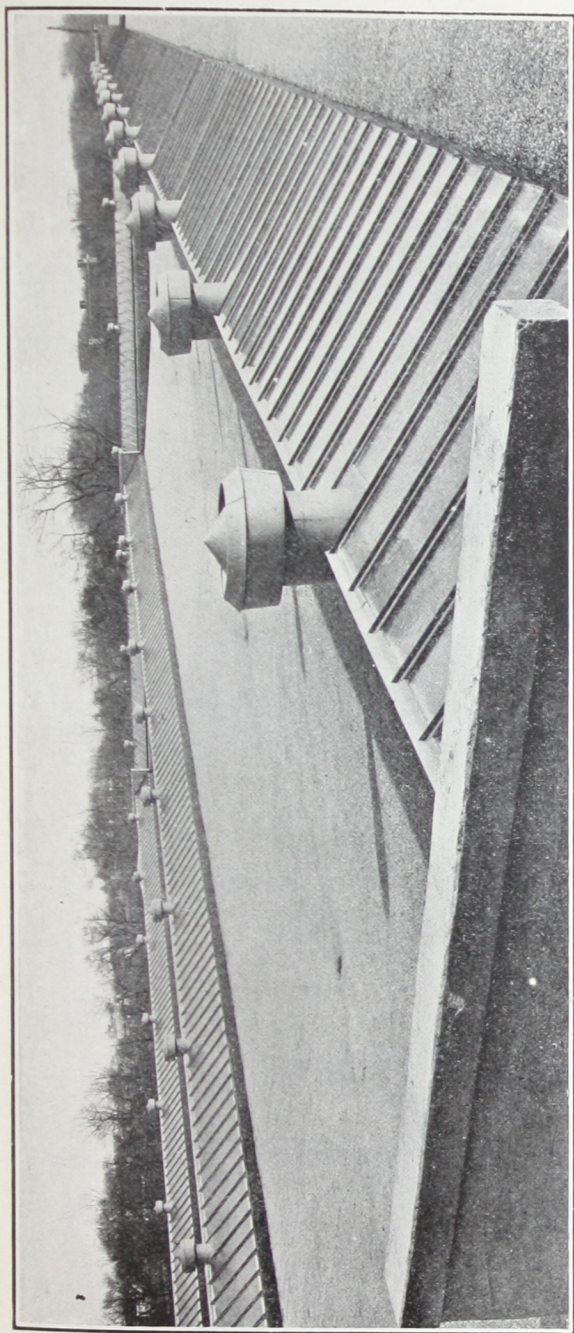
17-48" ROYAL Ventilators on the Roof of Train Shed, Toledo  
Railway & Terminal Co., Toledo, Ohio



## Ventilating Skylights With Royal Ventilators

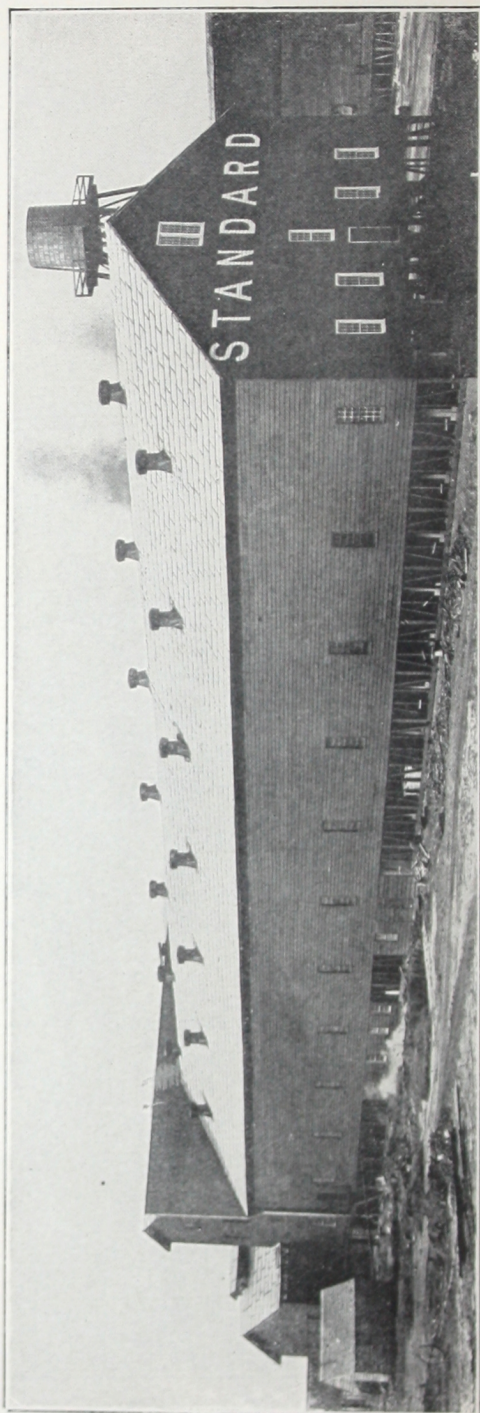
The size of the ventilators should always be determined by the area of the skylight and the amount of air they will be required to move; or, in other words, the size of the room under them.





Partial View of the Capitol Traction Co.'s Car Barn, Washington, D. C., 246' x 520'  
Properly ventilated with only 70-18" ROYALS.  
Wood, Donn & Deming, Architects, Washington, D. C.

## One Customer Using 400 36 inch "Royal" Ventilators



<sup>89-36</sup> Glass Top "Royal" Ventilators used on the immense plant of the Virginia-Carolina Co., Charleston, S. C. Selected in preference to all others. This concern has to date on their various plants throughout the South 400-36" "Royals."

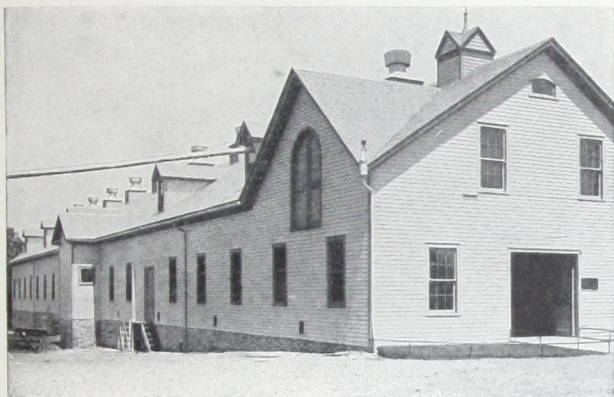
The "Royal" Ventilates from the Ground Up—Not from the Roof Down. There is No Back Draft



# Dairy and Stock Barns

ventilated with Insect Proof ROYAL Ventilators will prevent spontaneous combustion and annoyance from flies in summer, and provide proper ventilation for the stock at all times.

Pure air and a lack of dampness in stables and dairy barns are as essential features toward the health of cattle or horses as would be the case in the ordinary dwelling for people. Dampness in a stable is favorable to the development of disease germs. Dampness is an indication that a sufficient amount of air has not passed through the stable during the night when the doors and windows are closed.

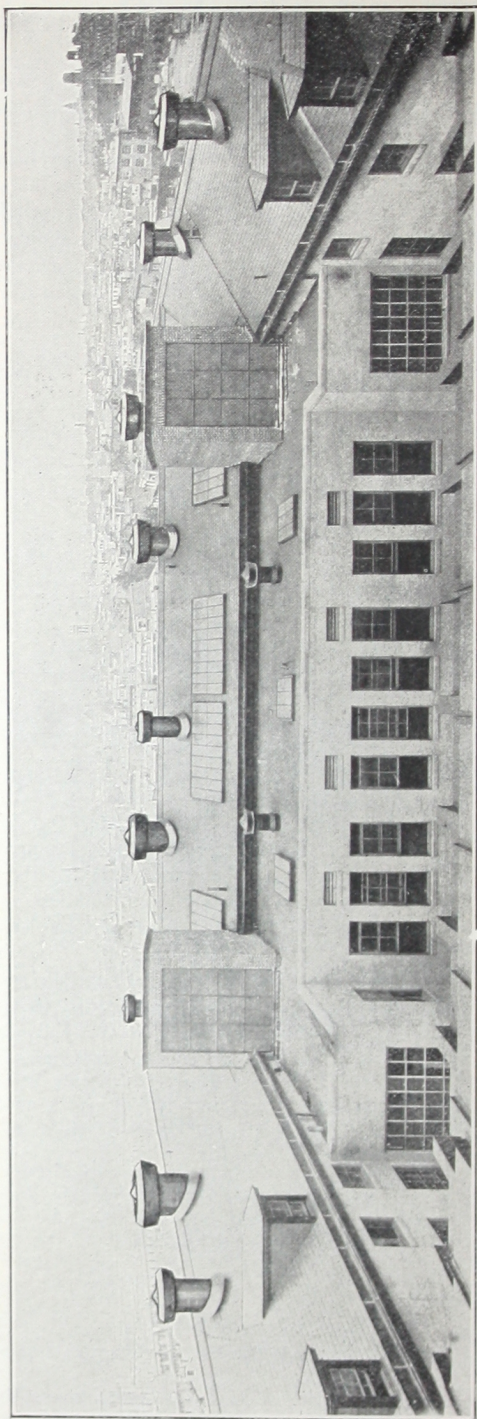


Dairy Barn of the Clifton Springs Sanitarium, Clifton Springs, N. Y. Equipped with "Royal" Ventilators

Oxygen of the air is just as important as a part of the nourishment of cattle or horses as is the food which is fed them. The amount of air which must be present in a building and which is necessary to supply the oxygen needed will be determined by the number of animals in that building. Also the amount of moisture which is to be removed from the air will depend on the number of animals. It is often stated that a cow requires an amount of air equal in weight to two and one-half times the weight of the feed and water combined, in order that the cow may breathe perfectly fresh air. Each cow above one thousand pounds in weight throws into the air from lungs and skin an average of more than ten pounds of moisture during each twenty-four hours.

Thus it will be seen that a considerable volume of air must pass through the building where animals are confined in order that the proper air may be furnished for breathing and that the moisture present may be carried away by the outgoing air. The flues which provide fresh air and take away foul air should provide not less than 36 square inches of area of flue per head of cattle or horses, when the out-take flue has a height of 30 feet. A ventilating flue 2 by 2 feet in section, through which the air moves at about three miles per hour, will provide sufficient air for twenty cows.

The top of the ventilator should be carried well above the highest part of the roof, so that the wind can have a free sweep across it.



The William Penn High School for Girls, Philadelphia, Pa.

This School, Costing Over \$565,000 and Seating 1500 Pupils, is Ventilated with One 78", Three 72", Three 66", One 50", Five 48", Two 30" and Four 24" "Royal" Ventilators

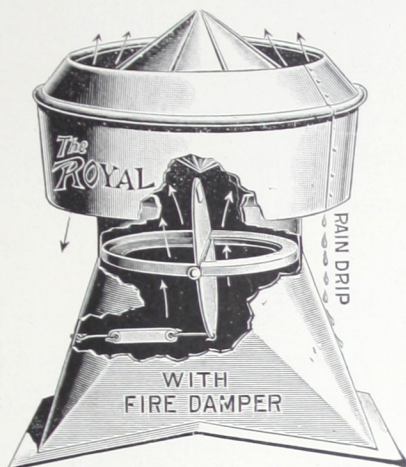


# The Fire Retarding "Royal" Ventilator

With Glass or Metal Top

For Factories, Shops, Theatres, etc.

The ventilator illustrated contains a special feature—that of a fire damper. The addition of this device, which is fitted with a fusible link, automatically closes in case of fire, whether inside or out. This feature, also, is of special value, as it acts as a protection in case of fire, which is most important.



Silently and surely, twenty-four hours each day, the ROYAL is "on the job," keeping your buildings pure and sweet.



Carnegie Library, West Philadelphia, Pa., 4-48" "Royals" in use  
R. Gilpin, Engineer

Lehigh Avenue Library, 2-40", 2-36" "Royals" in use.  
South Philadelphia Library, 2-48", 4-12", "Royals" in use.  
Passyunk Branch, 4-36" "Royals" in use.

# Notes on Ventilation

**Of** the two general systems of ventilation, Natural or Automatic and Mechanical, the former is considered the more economical.

To bring about the constant changing of air, inlets as well as outlets are required to every room or building. These appliances should be used with extreme care, otherwise it will soon be discovered that practice will in this case, as in most others, upset the theory laid down as to given laws.

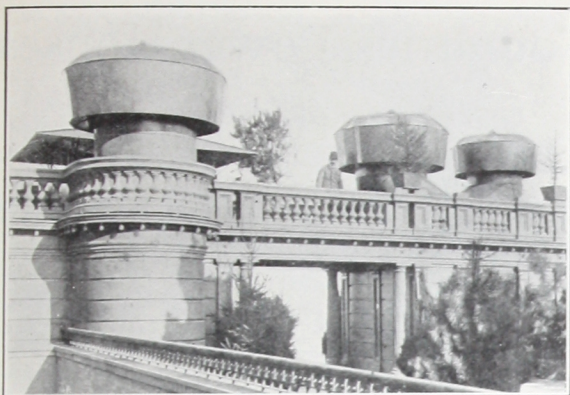
Dealing with the outlet first; there can be no such thing unless it is absolutely proof against down draft, as it cannot admit cold air from the outside and at the same time extract the hot or vitiated air from the inside.

All outlets, whatever form they take, should be placed at the highest point of the place requiring relief, and too much dependence should not be placed in single cone caps or small ventilators.

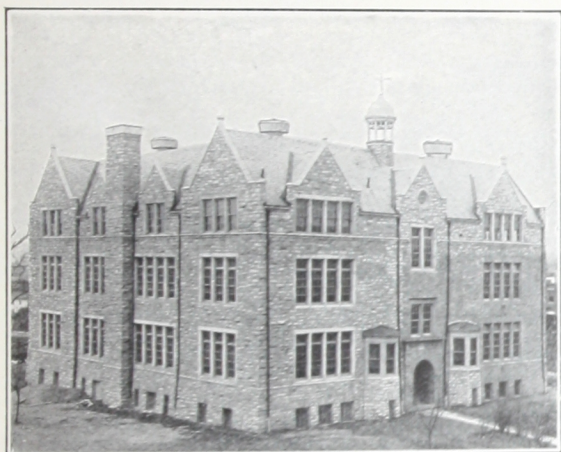
**Another strong point to be considered is that we never reduce the Quality.**







Waldorf-Astoria Hotel, New York City  
Showing 3-60" Copper "Royal" Ventilators after 15 years' service,  
still as good as the day they were installed



High School, Darby, Pa.—Geo. E. Savage, Architect, Philadelphia  
Ventilated with 4-54" "Royals"



Public School, Philadelphia  
Ventilated with 4-60" Copper "Royal" Ventilators  
Over 300 "Royal" Ventilators are in use on the Schools of Philadelphia

# Foundries, Power Houses, Factories, etc., Properly Ventilated at Little Cost

We have equipped foundries and buildings all over the world.

We can furnish the ROYAL Ventilator complete with base and necessary flashing, ready to be installed if desired.

In ordering do not fail to send sketch showing angle of roof or give pitch, stating if ventilators are to be placed on ridge or side of roof. This information is necessary to construct the base intelligently.

When foundries like

Reading Iron Works, Reading, Pa.

Pencoyd Iron Works, Philadelphia, Pa.

American Car and Foundry Co., St. Louis, Mo.

American Pulley Co., Philadelphia, Pa.

Fricke Co., Pittsburg, Pa.

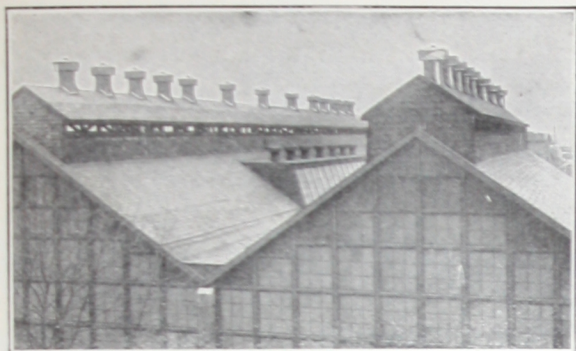
Frazer Jones Co., Syracuse, N. Y.

Tennessee Power Co., Cleveland, Tenn.

and hundreds like them equip their plants with ROYAL Ventilators, is it not time for you to consider installing them?

Let Us Figure on Your Requirements

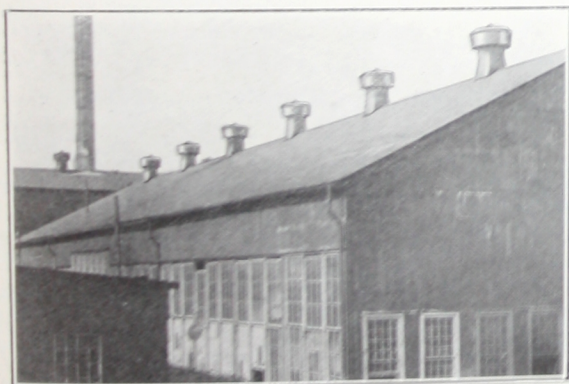




Partial View of the Fayette R. Plumb Co.'s Plant, Frankford, Pa. Dodge & Day, Engineers, Philadelphia. Ventilated with 35-30" and 20" "Royal" Ventilators.

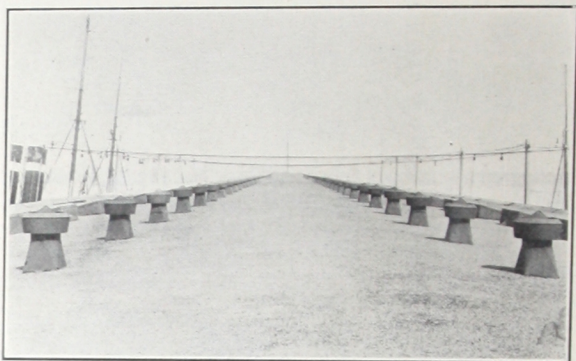


The Barrett Mfg. Co., Peoria, Ill., Largest Manufacturers of Roofing and Felts, are using 11-54" (shown above) and 21-46" "Royal" Ventilators on Their Buildings.

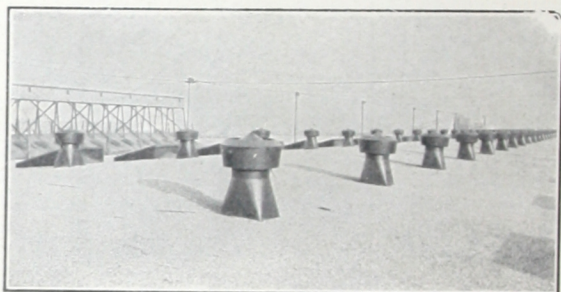


American Bridge Co.'s Buildings, Trenton, N. J., using 13-36" and 2-18" "Royal" Ventilators.

“Royal” Ventilators are used and endorsed by the majority of the Railroads for the ventilation of Cars, Boats, Piers, Shops, Sheds, Stations, etc.



Pennsylvania R. R. Pier No. 50, Philadelphia, Pa., showing 66-20" "Royal" Ventilators



Pennsylvania R. R. Pier No. 40, Philadelphia, Pa., Ventilated with 60-20" "Royal" Ventilators

### Huntington & Broad Top Mountain Railroad Co.

HUNTINGTON, PA., Dec. 20, 1909.

Gentlemen:

The twenty 20" round and the nine 4' x 6' "ROYAL" Ventilators which we have on our round house at Saxton, Pa., are fully up to all that you claim for them in carrying away the sulphur from the soft coal which we use exclusively on all our engines. In fact, it is a ventilator which *does* ventilate. I take pleasure in testifying that they meet all our requirements and I shall be very glad at any time to recommend your ventilators to any parties interested. I remain,

Yours truly,

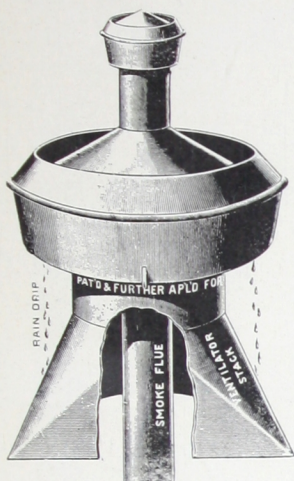
CARL M. GAGE,  
General Manager.



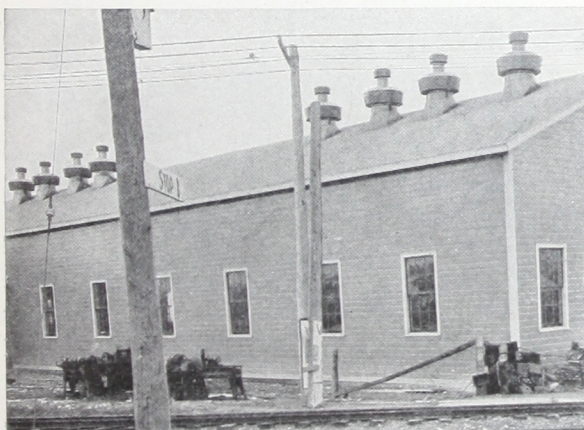
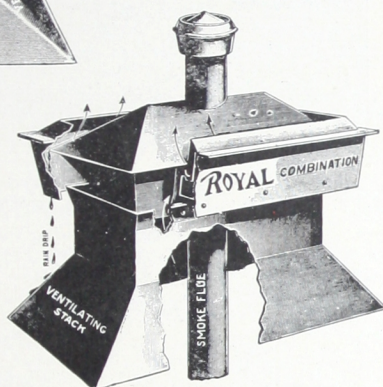
# The "Royal" Combination Smoke Jack and Ventilator

For Use on  
Blacksmith Shops  
Round Houses  
Foundries  
Schools, Jails, etc.

Made in All Sizes  
in both the Round and  
Rectangular Type



We can convince you that it can be done economically. Actual tests have demonstrated the superiority of the "Royal" over all other makes.



Utica Drop Forge Co., Utica, N. Y., using 12-36" "Royal" Combination Ventilators



Governor's Mansion, Harrisburg, Pa.  
 Ventilated with 2-36" "Royal" Ventilators.  
 J. J. Wilson, Consulting Engineer



Suburban Homes  
 Ventilated with "Royal" Ventilators



SMOKE JACK  
For  
RICHMOND ROUNDHOUSE

18 Diam

3-0

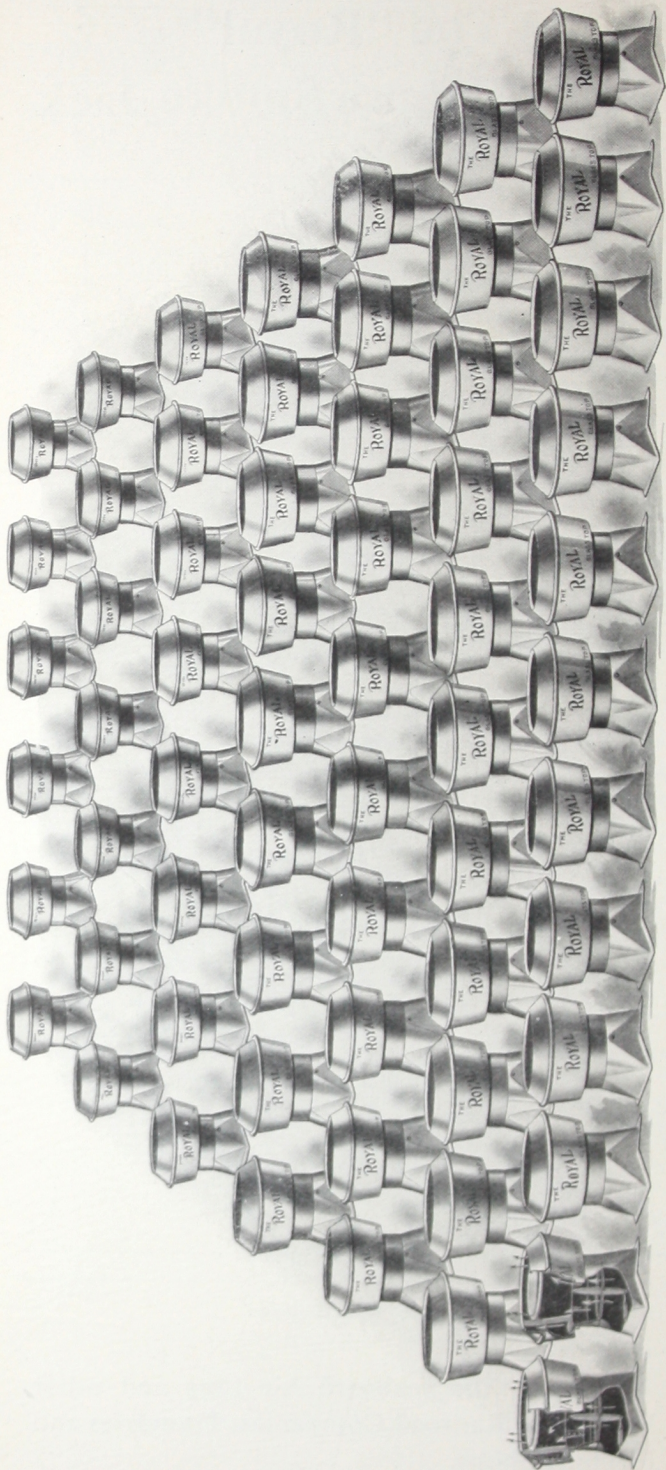
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Light and Ventilation

27

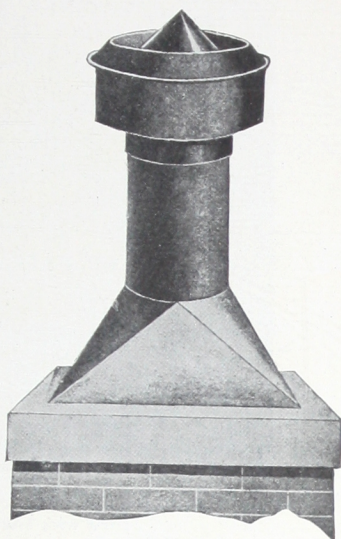
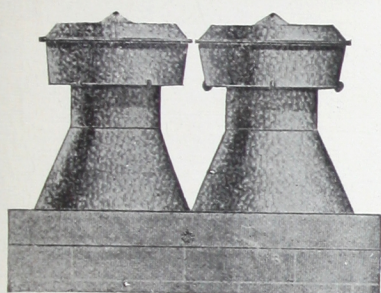
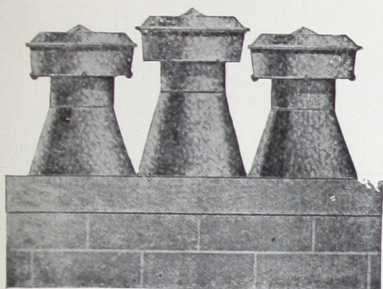


"65-36" Copper Glass Top "Royals," with Glass Dampers, in Use by The Syracuse Malleable Iron Works on their Foundry Buildings



# Royal Chimney Cowls

excell all others as agents for the prevention of downward currents and increase of drafts in sluggish flues.



The above cuts show the application of ROYAL Ventilators on chimneys and their graceful appearance when applied.

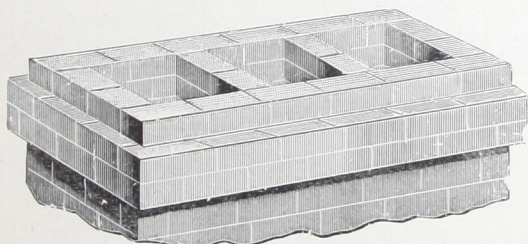
In building base, care should be taken to guard against dead air spaces. It should be made to fit securely over the chimney and then taper gradually to dimensions of pipe to which the cap is attached, thus allowing a free exit for smoke and gases.

When a chimney has two or more flues, a separate cap should be used, each independent of the other, but two or three flues may be covered with one base, having separate pipes and caps for each flue, as illustrated above.

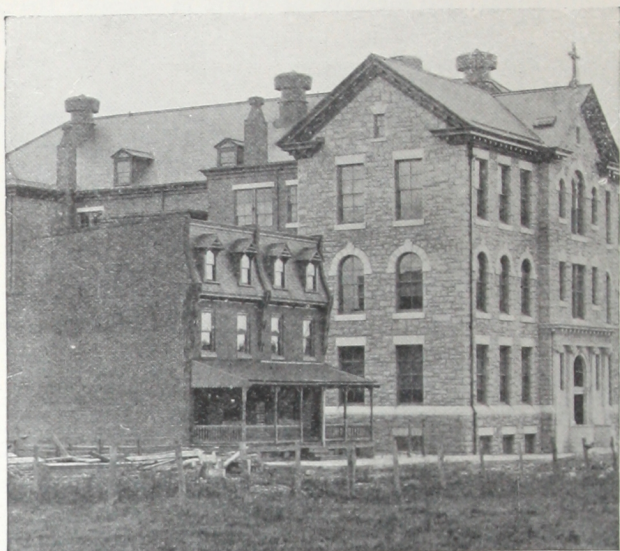
In such cases as above, attention should be given to building up the flues even with the top of the chimney, thus preventing the smoke and gases from rising in one and drawing down the other, as in a siphon.

In applying a ROYAL Ventilator, care should be used in selecting the proper size; *i. e.*, the capacity of the ventilator should be equal to the flue opening. Thus a 10" x 12" flue would require a 12" Vent.

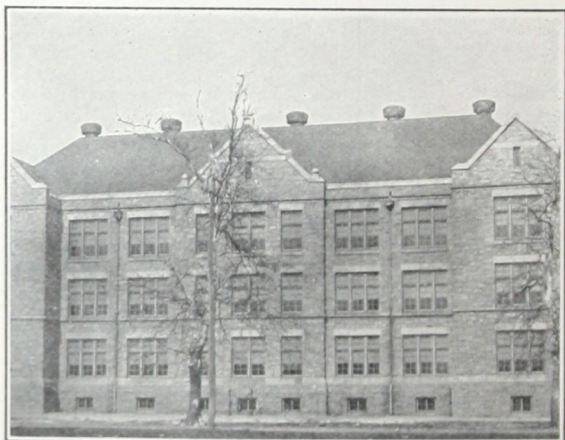
Caution in this respect will prevent any tendency toward the smoke and gases backing up in the pipe.



Showing Chimney Flues



A View of Immaculate Conception School, Germantown, Ventilated with 3-60" "Royal" Ventilators



Public School, Ventilated with 5-42" "Royal" Ventilators

Correct Principles and Careful Workmanship  
Have Won for Us Many Customers



# A Few of the Hundreds of School Buildings Ventilated with "Royal" Ventilators

Girard College, Philadelphia, Pa. (3—42', Glass Top)  
 2nd and Lebanon Street School, Philadelphia, Pa. (4—36")  
 Henry Horn School, Philadelphia, Pa. (5—42")  
 College of Physicians, Philadelphia, Pa. (9—36", 42", 48")  
 St. Vincent's Seminary, Germantown, Pa. (5—42")  
 Holy Name Parochial School, Philadelphia, Pa. (5—42")  
 Immaculate Conception, Germantown, Pa. (1—18", 1—24", 3—60")  
 Logan School, Philadelphia, Pa. (3—54")  
 Forrest School, Philadelphia, Pa. (2—36")  
 Whitehall School, Philadelphia, Pa. (2—50", 2—40")  
 William Penn High School for Girls, Philadelphia, Pa.  
 J. S. Hart Public School, Phila. (1—48", 1—54", 1—60", 1—72")  
 Belview School, Philadelphia, (1—48", 1—38", 3—40", 1—30")  
 School Building, Sayesville, N. Y. (1—54")  
 School Building, Scarsdale, N. Y. (1—72")  
 School Building, Poughkeepsie, N. Y. (1—42", 1—52", 1—48")  
 Rahway Reformatory, Rahway, N. Y. (5—36")  
 Public School Building, Spring Valley, N. Y. (1—44", 2—30")  
 High School, Saratoga Springs, N. Y. (2—44")  
 Owego School, Owego, N. Y. (1—90")  
 High School, Dover, N. J. (1—72")  
 Oakville School, Peekskill, N. Y. (1—72", 2—24")  
 Public School Building, Montclair, N. J. (2—60")  
 School Building, South Orange, N. J. (3—54")  
 13th Avenue School, Newark, N. J. (5—54", 1—30")  
 Hawthorne St. School, Newark, (2—18", 1—48", 2—54", 1—60")  
 Warren St. Schl., Newark, N. J. (1—18", 3—42", 2—2", 1—43")  
 St. Mary's School, Garden City, N. J. (1—60" x 60")  
 Washington School, West Orange, N. J. (1—60" x 60")  
 Stamford School, Stamford, Conn. (2—36" x 72")  
 State School for Epileptics, Fairbault, Minn. (10—24", 28", 36")  
 School Building, Washington, D. C. (2—66")  
 Mt. Pleasant School, Washington, D. C. (5—24", 2—60", 2—66")  
 Eastern Female High School, Baltimore, Md. (4—72", 2—48")  
 Public School Building, Baltimore, Md. (2—96")  
 Public School Buildings, Allentown, Pa. (1—60")  
 International Correspondence School, Scranton (6—25", 23—30")  
 Columbia School, South Orange, N. J. (2—48", 1—16")  
 Union Free School, Smithville, L. I. (2—40", 1—54")  
 High School, Montclair, N. J. (4—52" x 18")  
 Public School, Algar, O. (2—36")  
 N. J. Ave. School, Atlantic City, N. J. (2—54", 2—48")  
 Indiana Avenue School, Atlantic City, N. J. (2—54")  
 West Side School, Atlantic City, N. J. (2—48")  
 School Building, Sandusky, O. (4—42")  
 Northside High School, Minneapolis, Minn. (1—84")  
 Public School Buildings, New York City.  
 School Building, Ford City, Pa. (2—22", 2—60", 2—62")  
 Elmira Free Academy, Elmira, N. Y. (11—48")  
 Foxchase School, Foxchase, Pa. (1—40")  
 Martha Washington Schl., Philadelphia (4—36", 2—28", 2—20")  
 School Building, Oriskany, N. Y. (2—44")  
 School Building, Passaic, N. J., 13 Rectangular Vents.  
 Miller Street School, Newark, N. J. (2—28", 1—42")  
 Normal School, Newark (1—10", 1—12", 5—14", 7—24", 1—28")  
 School, Cuba, Kans. (2—36")  
 School No. 19, Erie, Pa. (1—90", 1—96")  
 School, Falconer, N. Y. (2—48")  
 High Bridge School, High Bridge, N. J. (1—72")  
 School, Cincinnati, O. (6—55")  
 McCall School, Philadelphia.  
 Cleveland School, Philadelphia.

## Buildings Equipped with "Royal" Ventilators

Municipal Hospital, Phila. (2-18", 2-30", 2-33", 2-36")  
 Cincinnati General Hospital, Cincinnati, O. (5-48", 1-44",  
 1-42", 3-36", 1-30", 2-24", 1-22", 5-20", 3-18", 4-15")  
 Packer Hospital, Sayre, Pa. (3-27", 1-28", 1-36")  
 Jefferson Hospital, Philadelphia, Pa. (1-54")  
 Potomac Elec. Power Plant Bldg., Washington, D. C. (1-30")  
 Akron, Canton and Youngstown Ry. Co., Akron, O. (5-18")  
 Bush Terminal Co., New York City (4-30")  
 Buffalo, Rochester and Pittsburgh Ry. Co. (5-14", 3-18")  
 P. and R. Ry. Co, Reading, Pa (12-24", 30-18")  
 Bayuk Brothers, Philadelphia, Pa. (8-24")  
 Consolidation Coal Co., Fairmont, W. Va. (4-60")  
 Powhatan Coal and Coke Co., Powhatan, W. Va. (4-36")  
 Federal Building, Wilmington, Del. (2-36")  
 Pension Building, Washington, D. C. (36-18", 2-24", 2-36")  
 Post Office Building, Charleston, W. Va. (1-30")  
 Arts and Science Building, Brooklyn, N. Y. (3-72")  
 United States Barge Office, New York City (3-24")  
 Navy Yard, Norfolk, Va. (3-24", 9-36")  
 Meadowlands Farms, Philadelphia, Pa. (6-20")  
 Dunwoodie Farms, Dunwoodie, N. Y. (8-12")  
 American Bridge Co., Pittsburgh, Pa. (1-12", 1-20")  
 New Amsterdam Savings Bank, Amsterdam, N. Y. (6-12",  
 2-16", 2-42")  
 Masonic Temple, Norristown, Pa. (1-36")  
 American Mausoleum Co., Clyde, O. (5-30")

## Factories and Foundries

Reading Iron Co., Reading, Pa. (20-42", 4-36")  
 Harrisburg Brass and Bronze Foundry, Harrisburg, Pa. (3-36")  
 National Radiator Co., Johnstown, Pa. (7-48")  
 S. F. Bowser & Co, Fort Wayne, Ind. (8-30")  
 U. S. Hame Co., Buffalo, N. Y. (4-24", 1-20")  
 Dominion Cannery, Ltd., Simcoe, Ont. (15-30", 10-48")  
 Sudbury Constr. Co., Sudbury, Ont. (4-16")  
 Horseshoe Lumber Co., River Falls, Ala. (7-24")  
 New Holland Machine Co., New Holland, Pa. (4-36", 8-24")  
 Frick Co., Waynesboro, Pa. (3-24")  
 J. J. Walsh & Son, Green Spring, W. Va. (5-36", 2-24")  
 Whitney Glass Co., Glassboro, N. J. (11-24")  
 Sun Oil Co., Marcus Hook, Pa. (8-36")  
 George C. Hetzel Co., Chester, Pa. (8-24")  
 Raymondville Paper Co., Raymondville, N. Y. (10-48")  
 Saranac Machine Co., St. Joseph, Mich (6-18", 2-24")  
 Penna. Lumber & Const. Co., South Fork, Pa. (2-30")  
 Burgess Norton Mfg. Co., Geneva, Ill. (3-24")  
 Florence Thread Co., Florence, N. J. (7-14")  
 Blaisdell Paper Pencil Co., Philadelphia, Pa. (9-24")  
 Bridgeton Iron Works, Bridgeton, N. J. (6-24")

## Abattoir and Packing Houses

J. J. Felin, Philadelphia, Pa. (44-12", 16-6", 19-8", 4-24")  
 Shenandoah Abattoir Co., Shenandoah, Pa. (6-24", 4-10")  
 Atlantic Abattoir Co., Atlantic City, N. J. (3-6", 4-10")  
 Cudahy Packing Co., Richmond, Va. (4-30", 8-16", 1-12")  
 Matadero De Luyano Co., Havana, Cuba (4-24")  
 Swift & Co., Jackson, Mich. (3-24")  
 Berwick Abattoir, Berwick, Pa. (5-24")  
 Frederick City Abattoir Co., Frederick, Md. (16-24", 7-8")



## Banks

Chelsea Bank, Norwich, Conn. (1-48", 1-42", 2-15", 1-12")  
First National Bank, Youngstown, O. (1-60")  
Mt. Joy National Bank, Mt. Joy, Pa. (1-48", 1-30")  
Farmers' and Mechanics' Bank, Minneapolis, Minn. (5-36")  
Girard Trust Co., Phila., Pa. (10-24")  
American Dock and Trust Co., Tompkinsville, S. C. (20-24")  
City Deposit Bank, Pittsburg, Pa. (2-16")  
First Nat'l Bank, Boston, Mass. (1-10", 3-18", 1-22")

## Barns and Stables

Finley-Acker & Co., Phila., Pa. (3-72")  
N. Y. Agri. Experiment Station, Geneva, N. Y. (6-24")  
Clifton Springs Sanitarium Co., Clifton Springs, N. Y. (9-24")  
Hillhurst Farm, Orchard Park, N. Y. (1-36", 6-24", 5-12")  
J. Gallagher, Philadelphia, Pa. (2-24", 5-18")  
H. C. Wintringham, Millerton, N. Y. (7-30")  
Wendover Farms, Bernardsville, N. J. (4-30")  
Essex Co Training School, Lawrence, Mass. (1-40", 3-18")  
J. W. Simpson, Esq., E. Craftsbury, Vt. (1-30", 4-48")  
C. C. Sudbury Co., Ontario, Canada (4-18", 3-14")

## Brass Works

Homer Brass Works, Philadelphia, Pa. (6-30", 6-12")  
Bunting Brass and Copper Co., Toledo, O. (7-42", 1-15")  
Trenton Brass and Machine Co., Trenton, N. J. (6-30")  
Rome Brass and Copper Co., Rome, N. Y. (6-48")  
Haines, Jones & Cadbury Co., Philadelphia, Pa. (25-30")

## Bridge Companies

Virginia Bridge and Iron Co., Roanoke, Va. (4-20")  
Baltimore Bridge Co., Baltimore, Md. (4-36")  
American Bridge Co., Trenton, N. J. (13-36", 2-18")

## Cement

Best Bros., Medicine Lodge, Kansas (17-20", 2-16")  
Dexter Portland Cement Co., Nazareth, Pa. (14-24")  
Hecla Portland Cement Co., Bay City, Mich. (5-24")  
Lehigh Portland Cement Co., Allentown, Pa. (6-24")  
Vulcanite Portland Cement Co., Vulcanite, N. J. (10-24")

## Chemical

Virginia-Carolina Chemical Co., Richmond, Va. (400-36")  
I. P. Thomas Co., Paulsboro, N. J. (6-36")  
Lake Superior Iron and Chemical Co., Detroit, Mich. (10-36")  
Albany Chemical Co., Albany, N. Y. (4-36")

## Ice, Lumber and Coal Companies

C. Reiss Coal Co., Sheboygan, Wis. (7-48")  
U. S. Coal and Coke Co., Pittsburg, Pa. (12-42", 21-30")  
Diamond Coal and Ice Co., Charleston, W. Va. (2-30")  
Consumers' Coal & Mining Co., Spilman, W. Va. (2-18", 4-12")  
North Jelico Coal Co., Woodbine, Ky. (1-24")  
Mt. Pleasant Coke Co., Hecla, Pa. (11-18")  
Continental Coke Co., Uniontown, Pa. (14-30", 4-24")  
East End Lumber Co., Shamokin, Pa. (2-40", 1-36")  
Shamokin Lumber and Mfg. Co., Shamokin, Pa. (2-24")  
Consolidated Coal Co., Hutchinson, W. Va. (4-60")  
Glen Willow Ice Co., Manayunk, Pa. (4-36")  
American Ice Co., Washington, D. C. (6-36")  
Davis Ice Co., Berlin, Md. (2-24")  
Mutual Ice Co., Alexandria, Va. (6-30")

## Electric Light and Power Plants

Jeff. Elec. Light, Heat & Power Co., Punxsutawney, Pa. (4—48")  
Wellman Seaver Morgan Co., Cle., O. (4—52", 24—24", 14—54")  
Salem Electric Light Plant, Salem, N. J. (4—36")  
Witherbee, Sherman & Co., Mineville, N. Y. (6—48")  
Rock. Light and Power Co., Portsmouth, N. H. (4—48", 6—24")  
Kilgoortie Power House, West Australia (22—30")  
Manila Light and Power Co., Manila, P. I. (24—30")  
General Electric Co., Harrison, N. J. (7—48")  
Philadelphia Electric Co., Philadelphia, Pa. (3—60")  
City R. R. Light and Power Co., Fishkill Land'g, N. Y. (1—48")  
Citiz. Elec. Light and Power Co., Fishkill Land'g, N. Y. (1—48")  
Rockland Light and Power Co., Nyack, N. Y. (2—36")  
Edison Electric Ill. Co., Pottsville, Pa. (2—36")

## Foundries

Syracuse Malleable Iron Works, Syracuse, N. Y. (69—36")  
Amer. Car & Fdry. Co. St. Louis, Mo. (23—60", 26—36, 10—24")  
Hardy, Tynes Fdry. and Mach. Co., Birmingham, Ala. (24—36")  
Utica Pipe Foundry, Utica, N. Y. (4—36")  
Camden Foundry Co., Camden, N. J. (4—30")  
Chandler & Price Co., Palmyra, N. Y. (4—48", 4—30")  
Remington Sherman Safe Co., Philadelphia, Pa. (24—18")  
Carbon Steel Cast. Co., Lancaster, Pa. (8—42", 2—36", 4—24")  
National Radiator Co., Trenton, N. J. (14—48")

## Glass

Cumberland Glass Co., Bridgeton, N. J. (6—36")  
George Jonas Glass Co., Minotola, N. J. (2—36")  
Bridgeton Glass Co., Bridgeton, N. J. (6—36")  
Moore Jonas Glass Co., Bridgeton, N. J. (11—24")

## Hospitals and Sanatoriums

State Hospital for Injured Miners, Hazleton, Pa.  
Danbury Hospital, Danbury, Conn.  
Veterinary Hospital, U. of P., Philadelphia, Pa.  
Municipal Hospital, Philadelphia, Pa.  
New York State Hospital, Middletown, N. Y.  
Atlantic City Hospital, Atlantic City, N. J.  
Missouri State Sanitarium.  
Jefferson Hospital, Philadelphia, Pa.  
State Sanatorium, Mt. Alto, Pa.  
State Hospital for Insane, Norristown, Pa.  
Iowa State Hospital, Waterloo, Iowa.  
St. Francis Hospital, Buffalo, N. Y.  
Home for Feeble Minded, Lapeer, Mich.  
New Consumptive Hospital, Brookline, Mass.

## Iron

Belmont Iron Co., Philadelphia, Pa. (1—24", 1—36")  
Trenton Iron Works, Trenton, N. J. (10—36")  
Variety Iron Works, Cleveland, O. (20—30")  
Parkesburg Iron Co., Pksbg., Pa. (3—72", 5—54", 8—30", 3—16")  
Tobatta Iron Works, Y. Ikawa, Japan (13—24")  
Camden Iron Co., Camden, N. J. (8—30")  
Structural Iron and Steel Co., Baltimore, Md. (5—24")

## Jails

Norristown Jail, Norristown, Pa. (2—42")  
Wisconsin State Prison, Waupun, Wis. (26—15")  
Canon City Jail, Canon City, Colo. (1—32", 1—22")  
Watertown Prison, Watertown, N. Y. (3—28", 1—48")  
Jail—St. Joseph, Mo. (2—34")  
" —Burlington, Vt. (1—40")  
" —Riverhead, L. I., N. Y. (5—38")  
Pauly Jail Bldg. Co., St. Louis, Mo.  
Rahway Reformatory, Rahway, N. J. (5—36")  
Jail—Jefferson City, Mo. (2—36")



## Machinery

New Holland Machine Co., New Holland, Pa. (4—36", 6—24")  
Scates Warm Air Furnace Co., Knoxville, Tenn. (16—30")  
Glens Falls Machine Co., Glens Falls, N. Y. (2—36")  
Utica Drop Forge Co., Utica, N. Y. (12—36", 12—16")  
Fayette R. Plumb Co., Frankford, Pa. (21—30", 13—20")  
Cincinnati Milling Machine Co. (40—26", 1—18", 3—36")  
American Pulley Co., Philadelphia, 1—5' x 15' (1—54", 1—48")  
Ferracute Machine Co., Bridgeton, N. J. (10—36")  
Manning, Maxwell & Moore, New York City (12—30")  
Rome Locomotive and Machine Co., Rome, N. Y. (3—36")  
La Crosse Plow Co., La Crosse, Wis. (1—20")  
Frick Co., Waynesboro, Pa. (5—48", 25—36", 4—30", 9—24")  
New Idea Spreader Co., Maria Stein, O. (3—36")

## Engines, Boilers, Etc.

Wm. Cramp & Son. Co., Philadelphia (6—36", 12—24", 10—22")  
Lebanon Boiler Works, Lebanon, Pa. (11—24")  
Harrison Safety Boiler Work, Philadelphia (5—24")  
Crane Valve Co., Philadelphia, Pa. (5—24")  
Nelson Valve Co., Philadelphia, Pa. (2—24", 2—18")  
Garlock Packing Co., Palmyra, N. Y. (2—40")

## Textile Mills

Elizabeth Mills, Charlotte, N. C. (8—24")  
Premier Cotton Mills, Helena, Ark. (13—18")  
Gaffney Mfg. Co., Gaffney, S. C. (8—30")  
Maple Cotton Mills, S. C. (23—24")  
Hamer Cotton Mills, Hamer, S. C. (20—24")  
Cochran Cotton Mills, Cochran, Ga. (6—24")  
Pendleton Mfg. Co., Autun, S. C. (12—24")  
Stonewall Cotton Mills, Stonewall, Miss. (2—28")  
Berlin Mills Co., Berlin, N. H. (2—60")  
Lackawanna Mills, Scranton, Pa. (2—54", 1—60")  
Peerless Finishing Co., Nyack, N. Y. (7—24")  
Duplane Silk Mills, Hazleton, Pa. (44—18")  
Clifton Cotton Mills, Clifton, S. C. (22—20", 2—30")  
Franklinville and Richmond Cotton Mills, N. C. (29—18")  
Liberty Silk Mills, New York City (20—20")  
Seneca Cotton Mills, Seneca, S. C. (2—66", 3—55", 2—30")  
Atlantic Gulf Mills, Quitman, Ga. (18—24")

## Theatres

Rome Theatre, Rome, N. Y. (1—60", 1—48")  
Opera House, York, Pa. (6—24")  
Midland Beach Theatre, Staten Island, N. Y. (1—120")  
Baker Opera House, Rochester, N. Y. (6—40")  
Vaudeville Theatre, Rutland, Vt. (1—54")  
Plaza Theatre, Broad and Ritner Sts., Phila., Pa. (3—42")  
Theatre, Atlantic City, N. J. (1—30", 2—72")  
New Fairmount Theatre, Phila., Pa. (1—10", 1—36", 8—30")  
Alhambra Theatre, Bridgeton, N. J. (4—36", 3—24", 2—12")  
New Orpheum Theatre, Germantown, Philadelphia, (1—60")  
Majestic Theatre, Erie, Pa. (1—48", 1—60")  
Frankford Theatre, Philadelphia (1—72", 3—36")

## Universities and Colleges

University of Illinois, Champaign, Ill. (3—20")  
Lehigh University, Bethlehem, Pa. (3—36")  
University of Penna., Phila., Pa. Over 300 from 12" to 48"  
Urbana College, Ill. (1—42", 4—36", 5—30", 3—24", 1—18")  
Georgetown Law School, Washington, D. C. (1—48", 2—42")  
Pennsylvania State College, State College, Pa. (6—26")

## Mercantile

N. Snellenburg & Co., Phila. (3—72", 12—36")  
Strawbridge & Clothier, Phila. (1—48")  
Peru Mercantile Co., Peru, Ind. (6—16", 1—10", 2—14")  
W. F. Gable Co., Altoona, Pa. (4—18")  
Gimbel Brothers, Phila. (26—12", 9—18", 16—8")  
J. Wanamaker, Phila. (2—36")

## Oil

Tide Water Pipe Co., Titusville, Pa. (18—36")  
Detroit Lubricator Co., Detroit, Mich. (1—24")  
S. F. Bowsher & Co., Ft. Wayne, Ind. (15—30", 1—24")  
Sou. Cotton Oil Co., Sav., Ga. (5—24", 6—48", 15—20", 4—30")  
Sun Oil Co., Marcus Hook, Pa. (8—36")

## Office Buildings

Empire Office Bldg, New York City (2—60")  
Singer Office Bldg., New York City (1—72")  
Park Row Office Bldg., New York City (1—54")  
Empire Bldg., Atlanta, Ga. (1—48", 1—32", 5—18")  
Reymond Bldg., Baton Rouge, La. (6—18")  
Bartlett Bldg., Atlantic City, N. J. (2—48")

## Paper

W. Va. Pulp & Paper Co., Piedmont, W. Va. (35—30", 30—34", 1—20")  
Uncas Paper Co., Norwick, Conn. (2—54")  
Coshocton Straw Paper Co., Coshocton, O. (6—30")  
Roanoke Rapids Paper Co., Va. (3—48", 4—36", 2—54", 1—30")  
New Haven Pulp & Board Co., New Haven, Conn. (1—36")  
Columb'n Paper Co., Bristol, Va.-Tenn. (8—36", 3—48", 4—32")  
International Pulp Co., Hailesboro, N. Y. (10—20")  
Hinckley Fibre Co., Hinckley, N. Y. (2—30")  
Bayless Pulp & Paper Co., Austin, Pa. (18—28")  
East Canada Power & Pulp Co., Montreal, Canada (3—24")  
Raymondville Paper Co., Raymondville, N. Y. (10—48")

## Printing

J. R. Lippincott Pub. Co., Phila. (3—22")  
Chilton Printing Co., Phila. (20—18")  
Printery I. C. Schools, Scranton, Pa. (20—30", 6—26")

## Railroads

Akron, Canton & Youngstown, Akron, O. (5—18")  
Buffalo, Rochester & Pittsburg (11—14", 2—12")  
New Orleans Rwy. & Lt. Co. (300—3½", 3—18", 1—30", 1—24")  
Manila Elec. Rwy. & Light Co., P. I. (3—30")  
Terminal of Long Island R. R. (20—16")  
Penna. R. R. Shops, Altoona, Pa. (35—8", 1—24", 4—16", 25—9")  
Penna. R. R. Bldg., Philadelphia, Pa. (18—24")  
Toledo Rwy. & Terminal Co., Toledo, O. (17—48")  
Penna. R. R. Piers, Philadelphia, Pa.:  
Nos. 10, 11, 14 (64—16")  
Nos. 13, 15 (18—16")  
Nos. 53, 55 (132—20")  
No. 46 (50—20")  
No. 50 (66—20")



# Testimonials from Well Known Architects, Engineers and Users of "Royal" Ventilators

J. B. SNYDER, Architect Board of Education, New York City, writes: "Test of 'ROYAL' O. K. We are specifying your designs."

W. CARBYS ZIMMERMAN, State Architect, Chicago, says: "Test 'ROYAL' is very satisfactory—have and will continue to use them."

PIERCE & BRICKFORD, Architects, Elmira, N. Y., say: "Ship one 10-inch as per your quotation to Board of Education, Owego, N. Y."

G. A. YOCUM Co., Minneapolis, Minn. "Please ship at once one 84-inch 'ROYAL,' to be used on East Side High School; also send us 35 samples. The one you sent is a 'dandy' and your Ventilator is a credit to anyone."

H. C. WINTRINGHAM, Millerton, Dutchess Co., N. Y., writes: "The 7 30-inch 'ROYAL' VENTILATORS are all in place, and I am very much pleased with them and their appearance."

S. E. PACE, *Architect*, Covington, Va., writes: "I received the Model of the 'ROYAL' and it is in my judgment the perfect Ventilator."

CHAS. H. CRAWFORD, Architect, Burlington, Vt., writes: "Your Ventilators have given me the best of satisfaction and I see no reason to change."

THE SUDBURY CONSTRUCTION AND MACHINERY Co., Sudbury, Ont., write: "The Ventilators you supplied for our Foundry have given every satisfaction; in fact the usual disagreeable odor is entirely absent in our Foundry."

C. M. PARKER, Publisher, Taylorville, Ill., writes: "I appreciate your promptness in making prompt shipment of Ventilators. I now have seven 'ROYAL' VENTILATORS on my printing establishment, and they are giving the best of satisfaction."

MOUNT CARMEL, Pa., April 21, 1913.

ROYAL VENTILATOR Co.,  
415 Locust Street,  
Philadelphia, Pa.

Gentlemen:—

Yours of the 17th inst. at hand, also catalogue and model, and beg to acknowledge that your Ventilators are to my entire satisfaction, and you may rest assured that when I am in want of Ventilators I will remember you.

Very truly yours,

C. E. STRAUSSER.

RUTLAND, Vermont, April 10.

ROYAL VENTILATOR CO.,  
415 Locust Street,  
Philadelphia, Pa.

*Gentlemen:—*

Replying to your favor relative to the 3—36" Royal Ventilators which you shipped to me last Fall, which were placed on my Foundry, will say that these have been entirely satisfactory, and should I require more ventilators in the future, would certainly place my order with you.

Very truly yours,

CHAS. E. DAVIS.

CHESTER, Pa., April 23, 1913.

ROYAL VENTILATOR CO.,  
Philadelphia, Pa.

*Gentlemen:—*

Replying to your inquiry relative to the six Royal Ventilators which we placed on our dye house, we advise that they are working entirely satisfactory and they have given us the results we expected.

Yours truly,

GEO. C. HETZEL CO.

KEYPORT, N. J., April 10, 1913.

ROYAL VENTILATOR CO.,  
415 Locust Street,  
Philadelphia, Pa.

*Gentlemen:—*

We beg to acknowledge receipt of the material on our order No. 562; same reached us in first-class condition.

We wish to compliment you both on your workmanship and also on your promptness in delivery.

Very truly yours,

NATIONAL FIRE PROOFING CO.

ALEXANDRIA, Va., April 10, 1913.

ROYAL VENTILATOR CO.,  
Philadelphia, Pa.

*Gentlemen:—*

Referring to your favor regarding the Ventilators that we purchased from you some time ago have only recently been put in place. From present indications, they are going to give us perfect satisfaction and all that we had expected.

We will, perhaps, be in the market for some new additional Ventilators in the near future, and if so, you can be assured that they will be the ROYAL.

Very truly yours,

MUTUAL ICE COMPANY.

SIMCOE, Ontario, April 10, 1913.

ROYAL VENTILATOR CO.,  
415 Locust Street,  
Philadelphia, Pa.

*Dear Sirs:—*

Replying to your inquiry regarding Ventilators which you supplied us.

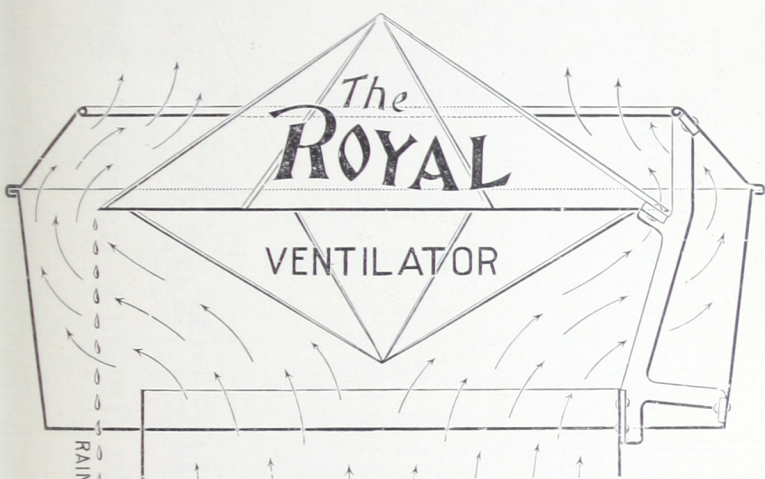
Kindly note the Ventilators on our Gas Engine Room are giving first-class satisfaction, but we have not yet placed the ventilators in position in the other part of our building.

Very truly yours,

DOMINION CANNERS, Ltd.



# "Royal" Ventilators are Absolutely the Best



Note the Efficiency, Strength and Durability of the "Royal"; our Double Cones with Heavy Ribs and Braces; our Double Outside Deflector.

Only First Class Mechanics are Employed  
in the Construction of "Royal" Ventilators

# Pilot Drawing of "Royal" Ventilators Giving Sizes and Dimensions

The accompanying table gives the Sizes and Dimensions of the "Royal" Ventilator in connection with the Pilot drawing shown in Fig. 5

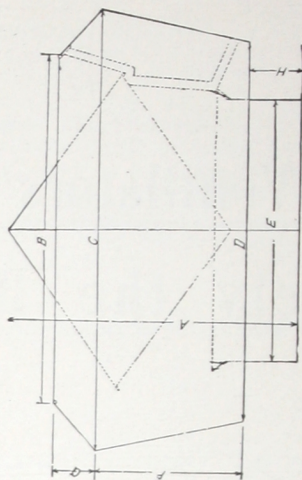


Fig. 5. Pilot Drawing of Royal Ventilator

Size of Ventilator	A	B	C	D	E	F	G	H	Size of Ventilator	A	B	C	D	E	F	G	H
Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch
18	19	22	28	26	18	8	3	6	40	42	50	63	58	40	20	6	8
20	22	26	32	29	20	11	3	6	42	42	52	68	62	42	22	7	8
22	23	28	35	30	22	13	3	6	48	42	62	76	70	48	19	9	10
24	25	29	38	34	24	14	4	6	50	50	63	80	74	50	26	9	10
26	27	33	43	38	26	14	4	6	54	54	67	87	78	54	30	10	10
30	28	40	52	43	30	15	4	7	60	57	79	96	88	60	30	10	11
33	37	44	55	47	33	16	5	7	66	67	87	108	97	66	31	12	12
36	39	44	56	53	36	17	6	8	72	78	94	120	105	72	32	14	14

Always Specify "Royal" Ventilators  
Illustrated in Sweet's Indexed Catalog



# Our Guarantee

We make a positive guarantee that the "Royal" Ventilator will exhaust more air per minute than any other ventilator, and that a less number of "Royal" Ventilators are required to accomplish the same results than any other make.

We further guarantee that our edgewise braces, double cones, tapered frustrums, wired edges and standing seams make the "Royal" the strongest and best ventilator on the market, with prices no higher than other makes.

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## Test of 12 in. "Royal" Ventilator

Made by

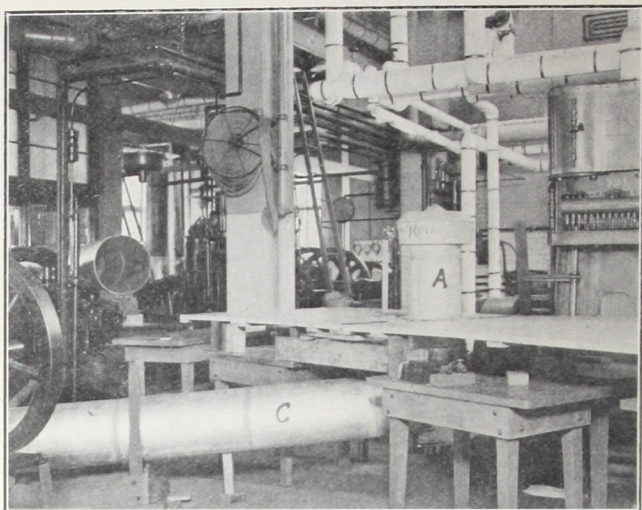
E. H. Ehlers

Professor of Experimental Engineering

University of Pennsylvania, Philadelphia, Pa.

May 18th, 1913

I wish to submit the following report of the test conducted to determine the exhausting capacity of a 12-inch ROYAL Ventilator due to wind velocities of 7, 10 and 15 miles per hour. As used in actual service, the exhausting capacity of such a ventilator is dependent upon the velocity of the wind acting upon it and upon the difference in pressure and temperature of the air inside and outside the building. As the variations would be almost beyond control, it was decided to conduct the tests in such a manner as to eliminate entirely the "chimney" action of the ventilator, and to determine only the exhausting capacity directly due to certain wind velocities. The *total* effect in any installation would always be greater than that due to the wind alone.



The test arrangements are shown in the above print. A standard 12-inch ROYAL Ventilator—"A" was picked at random from the stock shelves. The ventilator was carried on an 18-inch base, resting on a flat roof 4 feet 5 inches x 13 feet 5 inches. The pipe "C" was connected to the bottom of the ventilator and was long enough to place the inlet beyond the effect of the wind. The discharge from an 18-inch fan was led to a nozzle "D"—24-inch opening—16 feet from the ventilator. Anemometers were used to determine the average velocity in the inlet pipe and in a plane 11 inches in front of the ventilator. The entire equipment was set up in a large laboratory, all windows and doors being kept closed to avoid disturbing air currents. "Chimney action" could not exist as the entire equipment was subject to the same air pressure and temperature. The results obtained are given in the table below.

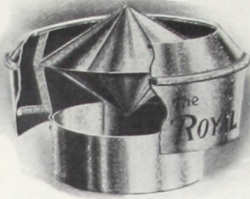
## Results of Test on 12 Inch "Royal" Ventilator

Wind Velocity Miles per Hour	Exhausting Capacity Cubic Feet per Minute
5.8	90.5
7.0	159.0
10.0	215.0
15.0	317.0



The following table will show the approximate exhaust of air per minute of ROYAL VENTILATORS in actual service. The wind blowing about seven miles per hour.

Size Inches	Area in Square Inches	Cubic Feet Exhaust Per Minute
2	4	7.7
4	13	25.0
5	19	36.4
6	28	54.0
7	40	77.0
8	50	96.4
9	64	123.4
10	78	140.8
12	113	159.0
13	134	218.4
14	164	306.3
15	177	341.4
16	201	387.7
18	255	490.4
20	314	605.7
22	380	728.6
24	453	873.7
26	521	1004.8
28	615	1185.7
30	707	1363.6
32	804	1550.8
34	908	1765.3
36	1 017	1961.4
40	1,257	2424.3
42	1,386	2672.8
44	1,620	3124.4
48	1,809	3488.6
50	1,964	4609.8
54	2,390	5413.6
60	2,807	6665.0
66	3,456	7851.0
72	4,071	10682.4
84	5,539	12267.7
90	6,361	13959.0
96	7,238	21810.0



# Standard Price List

of

## Galvanized Iron & Copper

### "Royal" Ventilators

Size Neck Measure Inches	Gauge Iron	Price	Shipping Weight Lbs.
2	26	\$1.00	—
4	26	1.75	5
5	26	2.50	6
6	26	3 40	6
7	26	4.00	8
8	26	4.65	10
9	24	5.25	10
10	24	5.75	15
12	24	6.75	20
13	24	10.00	20
14	24	13.00	20
15	24	16.00	25
16	24	20.00	25
18	24	27 00	35
20	24	33.00	45
22	24	36.00	50
24	22	40.00	50
26	22	50.00	60
28	20	56.00	65
30	20	65.00	75
32	20	80.00	85
34	20	100.00	90
36	20	120.00	100
40	18 & 20	180.00	150
42	18 & 20	190.00	175
44	18 & 20	200.00	200
48	18 & 20	240 00	225
54	18 & 20	300.00	285
60*	18	360 00	350
66	18	420.00	450
72	18	480.00	550
84	16	600.00	750
90	16	660.00	950
96	16	720.00	1075
10 ft.	16	960.00	—

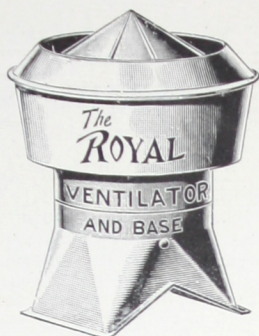
#### Discount on Application

The price of the bases are always extra, regulated according to the number and sizes required.



# PRICES OF "Royal" Ventilators

Complete with Bases, Dampers  
and Flashing



Size Inches	Gauge Iron	Gauge Copper	Price Iron	Price Copper
10	24	16 oz. C. R.	\$5.00	\$12 50
12	24	16 "	5.50	13.50
13	24	16 "	6.00	15.00
14	24	16 "	6.50	16.50
15	24	16 "	7.50	18.50
16	24	16 "	8.50	21.00
18	24	16 "	9.50	23.50
20	24	16 "	10.50	26.50
22	24	16 "	12.50	31.00
24	22	16 "	15.00	37.50
26	22	16 "	18.00	45.00
28	20	16 "	20.00	50.00
30	20	16 "	22.50	55.00
32	20	16 "	24.00	65.00
34	20	16 "	27.50	70.00
36	20	18 "	30.00	80 00
40	18 & 20	18 "	35.00	90.00
42	18 & 20	18 "	40.00	100.00
44	18 & 20	18 "	45.00	120 00
48	18 & 20	20 "	50 00	145.00
54	18 & 20	20 "	65.00	170.00
60	18	24 "	85.00	200 00
66	18	24 "	97.50	225.00
72	16 & 18	24 "	110.00	250.00

Galvanized Iron, Less Discount of .....

Copper, Less Discount of .....

Bases Made to Fit Any Desired Type or Pitch of Roof

Architects Please Specify

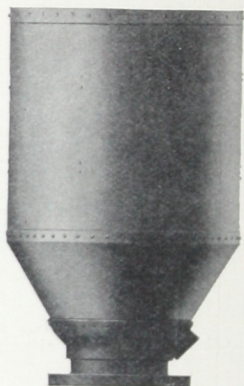
## "Royal" Ventilators

Manufactured by Royal Ventilator Co.  
Philadelphia, Pa.

# The "Royal"

## Steam Exhaust Head

The great efficiency and the very low cost of the ROYAL Exhaust Head should strongly appeal to every user of steam where the steam is allowed to exhaust in the air. The saving it effects is out of all proportion to its cost. A roof constantly wet from such exhaust will soon be destroyed. In winter it prevents the formation of ice on the pavements. It will also effect considerable saving in fuel and boilers. Every gallon of fresh water used con-



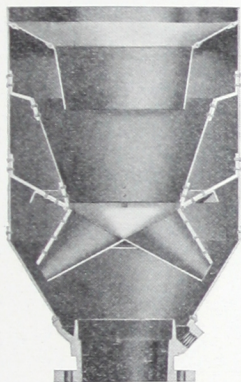
tains scales forming mineral, the more scale the more heat necessary to generate steam; but by using the water condensed by the ROYAL Exhaust Head, a supply of distilled water is obtained free from mineral.

The patented ROYAL Exhaust Head is constructed on scientific lines. Its action is simple yet positive. There is no back pressure nor any danger of explosion by overloading. If you will observe other heads, you will note that the outlet is as small or smaller than the inlet, whereas in the ROYAL, it is always larger. This is an important feature that other manufacturers have not been able to accomplish without throwing oil and water.



There are no complications in the shape of baffle plates to impede the escape of the steam. It is not necessary to examine the ROYAL after erecting, as there are no parts to get out of order.

The base is made of heavy Malleable Iron, which is much more durable than cast iron, used by most manufacturers of exhaust heads. The drain, inlet connections and drain gutter are formed into one Malleable Iron casting with passages so arranged that all condensed water is immediately discharged. This prevents the collection of sediment, avoids water pockets, rust and leakage.



## Principle of Operation

The Exhaust Steam passing through the pipe strikes the cone directly above the inlet. This breaks up the steam and a portion of steam is condensed. The steam then passes along the deflector cone between the outside wall and deflector ring and striking the top cone is forced down into the deflector ring. The dry vapor then escapes through the outlet. Of the water which has been condensed a portion passes down the inner wall of the shell and the remainder passes through the drain spouts and out through the drip.

# Construction

The ROYAL Exhaust Head is manufactured from the best grade of open hearth Galvanized Iron of heavy gauge and equipped with Malleable Iron base. All seams and connections are riveted and soldered, making the head rigid and watertight. The construction throughout is such as to insure strength and durability.

Sizes 4 1-2" and smaller have heavy bases threaded. Heads 5" and larger are furnished with extra heavy companion flange drilled to standard template.

We carry a stock for immediate delivery, up to and including 12". Larger sizes made to order on short notice.

## Price List of the "Royal" Exhaust Head

F. O. B. Philadelphia

Diameter of Exhaust Pipe Inches	Price	Height Inches	Diameter Inches	Size of Drip Inches	Net Weight Pounds
1 or 1½	\$7.00	15	14	1½	16
2 or 2½	8.00	19	17	1½	21
3 or 3½	9.00	21	20	1½	30
4 or 4½	12.00	23	22	1½	37
5	16.00	27	25	2	90
6	20.00	32	28	2	120
7	25.00	41	24	2	135
8	30.00	44	26	2	160
10	42.00	48	30	2½	220
12	50.00	52	33	2	250
14	72.00	56	37	2	300
16	100.00	62	42	2	400
18	110.00	68	48	3	510
20	125.00	74	54	3½	650
22	150.00	78	58	3½	700
24	200.00	82	64	4	800







